EFFECT OF STRESS INOCULATION TRAINING & EYE MOVEMENT DESENSITIZATION AND REPROCESSING ON SELECTED PSYCHOLOGICAL AND PHYSIOLOGICAL VARIABLES IN SHOOTERS

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It is a bonafide record of original work carried out under the supervision of Dr Gayatri Pandey and co supervision of Dr Kuldeep Singh and has not been submitted in full or part to any other university or institute for a degree or diploma. Further, it is certified that the synopsis is plagiarism-free and the proof has been submitted.

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ABSTRACT

The proposed research intends to understand the effects effect of stress inoculation training & eye movement desensitization and reprocessing on selected psychological and physiological variables in shooters. For the purpose of the study, a total of 43 Shooters voluntarily participated ina screening test for sports competition anxietyusing the sports competition anxiety test. Out of 43 shooters, 38 shooters scored in a range of medium to high sports competition anxiety. Further out of 38 shooters only 30 shooters, further participated in the study. As a result, this sample of 30 will be randomly assigned to experimental treatment group I which is stress inoculation training-based intervention where 10 shooters are randomly assigned to this group. Similarly, 10 shooters were randomly assigned to experimental group II which will be subjected to eye movement desensitization and reprocessing based intervention and another set of 10 shooters were randomly assigned to active control group. The age range of the sample selected for the study is 18 to 30 years. The study will follow a pre-post experimental design to understand the impact of the aforementioned interventions on selected psychological variables such as pre competition anxiety, mental toughness and perceived stress in addition to accounting for effects the intervention draws on physiological variables such as heart rate, blood pressure, galvanic skin response and cortisol levels. For analyses of quantitative data for selected psychological and physiological variables,the data will be tested for normality using the Shapiro-Wilk test of normality. For analysis of quantitative data, one-way MANOVA and ANCOVA will be employed using IBM SPSS v.26. For analysis of pre competition anxiety, in addition to quantitative methods of statistical analysis, the semi structured interview data will be analyzed using qualitative methods of data analysis. The results of this research may provide valuable insights into the effectiveness of stress inoculation training and eye movement desensitization and reprocessing on selected psychological and physiological variables in shooters.

Keywords: *Stress inoculation training, Eye movement desensitization and reprocessing, shooters, Pre competition anxiety, mental toughness, perceived stress, heart rate, cortisol, blood pressure, galvanic skin response*

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CHAPTER I

INTRODUCTION

The Mind and Body Connection is one that has prominent significance in shooting as an Olympic sport. If the mind senses a stressor, then a stress response is triggered in the body, which would inadvertently affect the movement of the sportsperson. Given the individual nature of shooting as a sport which is mostly trained in isolation, for long hours in the shooting range, they are in hindsight largely left alone with trains of thought in their minds and the equipment in their hands. It is at this moment that one can understandhow important one's self-statements, internal language, and own dialogues in the context of themselves can have an impact on their body, which in turn will inevitably translate into a shot (Culverhouse, 2017).

1.1 Shooting sport

As a typical precision-oriented sport with very narrow margin of errors, shooting demands athletes to possess a high level of accuracy, stability, focus, and other skills. They also need to maintain mental and physical consistency during training and competition, as well as a high degree of unity through technical motions before and after. As a result, shooting sports place a very high demand on athletes' psychological stress tolerance and emotional stability, which is also a key component of attaining exceptional shooting performance (Li et al., 2009).

1.2 Concept of Stress Inoculation Training (SIT)

The notion of stress inoculation training was developed by Meichenbaum (1980) which was based largely on his theoretical foundations of cognitive behavior modifications (CBM), which was a therapeutic technique developed by him that postulated that the changes in behavior occur through a series of intermediary processes that involves the interplay between one's inner dialogue or internal language and their cognitive sets or structures that determine their subsequent behavioral actions.

The phases of SIT consist of 3 phases. The first phase is the education phase which gives subjects an understanding of how stressors occur. Researchers suggest that this phase is particularly important. Accordingly, the clients are given explanation of the arousal/performance relationship and its implications for their respective sport. This is followed by briefly introducing the sessions that are planned for them in the future and how it will impact their performance. In the second phase, which is known as the rehearsal stage, the client is taught appropriate coping skills pertaining to their particular issues. The third phase, referred to as theapplication phase, gives the clients an opportunity to practice their coping

skills in simulated low/moderate stress situations. (Meichenbaum, 1980).

1.3 Concept of EMDR

Eye movement desensitization and reprocessing is a psychotherapy-based treatment protocol that focuses on releasing, desensitizing, processing, and resolving the unprocessed traumatic events into the semantic memory of the affected individual. It was a technique that was chanced upon by Shapiro (1989) that led her to develop a theoretical and treatment framework for trauma-ridden individuals, especially those suffering from PTSD, anxiety, and depression (Kullack & Laugharne, 2016).

The framework is based on the Adaptive information processing (AIP) model claims that the bilateral stimulation either through eye movement or alternate hand tapping tends to balance the natural integration of traumatic memory into the semantic memory thereby allowing the reprocessing of the disturbing events into an acceptable, comprehensive reprocessing of the experience (Shapiro, 2016).

1.4 Phases of EMDR

The treatment protocol of EMDR-based psychotherapy comprises 8 stages that span over firstly taking the history of the client, followed by preparing the client/participants for the upcoming stages of bilateral stimulation. The third stage consists of assessing the client by identifying the image, cognitive, affect, and the body sensation associated with the targeted memory along with two measures i.e., Validity of Cognition (VOC) and Subjective Unit of Distress (SUD). The fourth stage is the desensitization phase, while the fifth stage is the installation phase which as the name suggests, refers to the installation of a positive cognition in place of the targeted memory that one has now become desensitized towards. The sixth stage is body scan in which the client/participant is asked to scan their body for any physical or physiological residues of distress. The seventh and eighth stage is closure and re-evaluation, respectively.

1.5 Anxiety and Sports Performance

Shooting as a highly precision oriented sport demands athletes to possess a high level of accuracy, stability, focus, and other skills. They also need to maintain mental and physical consistency during training and competition, as well as a high degree of unity through technical motions before and after (Li et al., 2009). As a result, shooting sports place a very high demand on athletes' psychological stress tolerance and emotional stability (Qiu et al., 2022), which is also a key component of attaining exceptional shooting performance. Cognitive skills like

target orientation and focus are required for shooting. Coordination between the sensory and motor systems, local attention processing, constant observation of outside inputs, and adaptable attentional focus switching are all necessary (Zhang et al., 2008).

1.6 Mental toughness, Stress, and Sports Performance

The experience of stress plays a major role in the realm of sports. Most of the studies on stress have focused on the athlete's experiences however it has been emphasized that an athlete's support staff, coaches, match officials are also subjected to the lot of stressors and therefore one must also take into account their issues and devise solution-oriented coping strategies for them. Stress has been shown to affect performance and social functioning (Jones & Hardy, 1990).

Statement of the problem

The purpose of this study is to study the effects of stress inoculation training & eye movement desensitization and reprocessing on selected psychological and physiological variables of shooters.

Research Questions

The following research questions were formulated with regard to the present study:

I. Whether there will be an effect of SIT on the selected psychological variables in Shooters?

II. Whether there will be an effect of SIT on the selected physiological variables in Shooters?

III. Whether there will be an effect of EMDR on the selected psychological variable in Shooters?

IV. Whether there will be an effect of EMDR on the selected physiological variablesin Shooters?

V. Whether there will be any differences in the effects produced between SIT and EMDR on the selected psychological variables in Shooters?

VI. Whether there will be any differences in the effects produced between SIT and EMDR on the selected physiological variables in Shooters?

Objectives of the Research

I. To examine the effects of SIT on the selected psychological variables in shooters

II. To examine the effects of SIT on the selected physiological variables in shooters

III. To examine the effects of EMDR on the selected psychological variables in shooters

IV. To examine the effects of EMDR on the selected physiological variables in shooters

V. To examine the difference between the effectiveness of SIT and EMDR on the selected psychological variables in shooters

VI. To examine the difference between the effectiveness of SIT and EMDR on the selected physiological variables in shooters

Research Hypotheses

Based on the review of literature the following alternative hypotheses were proposed:

I. There will be a significant effect of stress inoculation training on the selected psychological variables i.e., anxiety, perceived stress, and mental toughness in shooters

II. There will be a significant effect of stress inoculation training on the selected physiological variables i.e., heart rate, blood pressure, galvanic skin response, and cortisol levels in shooters

III. There will be a significant effect of eye movement desensitization and reprocessing on the selected psychological variables i.e., anxiety, perceived stress, and mental toughness in shooters

IV. There will be a significant effect of eye movement desensitization and reprocessing on the selected physiological variables i.e., heart rate, blood pressure, galvanic skin response, and cortisol levels in shooters

V. There will be significant differences in the effectiveness of stress inoculation training and eye movement desensitization and reprocessing on the selected psychological shooters

VI. There will be significant differences in the effectiveness of stress inoculation training and eye movement desensitization and reprocessing on the selected psychological shooters.

Delimitations of the Research

1. The present study will be delimited to 30 shooters, both male and female who have minimum participation at the National level
2. The present study will be delimited to shooters whose age ranges from 18 to 30 years
3. The present study will be delimited to two selected psychological interventions:
   I. Stress inoculation training (SIT)
   II. Eye movement desensitization and reprocessing (EMDR)
4. The study will be delimited to the following psychological and physiological variables:

A) Psychological variables

I. Sports Competition Anxiety
   - Cognitive anxiety
   - Somatic anxiety
   - Self-confidence

II. Mental Toughness
   - Control
   - Constancy
   - Confidence

III. Perceived Stress

B) Physiological variables

I. Heart Rate

II. Blood Pressure
   - Systolic blood pressure
   - Diastolic blood pressure

III. Galvanic Skin Response

IV. Cortisol level

Operational Definitions

I. **Anxiety:** The American Psychological Association (APA) defines anxiety as "an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure." This anxiety can manifest as somatic anxiety or cognitive anxiety. The former is characterized by physiological arousal while the latter is usually experienced in the form of worried thoughts, negative thinking, etc.

II. **Somatic Anxiety:** It refers to the physical manifestation of anxiety resulting in increased heart rate, blood pressure, etc. Somatic anxiety can therefore impair the performance of an athlete and it becomes imperative to learn how to manage it so that it does not hamper one's sports performance.

III. **Cognitive Anxiety**: According to the dictionary, cognitive anxiety refers to the mental component of anxiety and is caused by negative expectations about success or by negative self-evaluation. One theory of anxiety suggests that if an athlete's cognitive anxiety is high and somatic anxiety is on a continuous rise, it can lead to sudden dip in performance (Hardy et al., 1991)

IV. **Self-confidence**: It refers to the perception that an individual has regarding their ability to successfully carry out a behavior or task. In sports, the competitive state anxiety inventory developed by Martens et al. (1990) has a subscale called self-confidence state; this refers to the perception an athlete has with regard to their ability to perform well in the competition at that particular moment.

V. **Competitive State Anxiety**: It refers to the situationally specific measure of anxiety in the context of competitive situations that are perceived as threatening by the individual competing in a sport (Martens, 1977).

VI. **Perceived Stress**: The Perceived Stress Scale was created to assess the extent to which individuals evaluate life experiences as stressful. Psychological stress is defined as the degree to which individuals regard their demands as surpassing their capacity to manage.

VII. **Mental Toughness:** Mental toughness is defined as possessing a natural or cultivated psychological advantage that allows an individual to: generally, manage the various demands (competition, training, lifestyle) imposed by sport more effectively than competitors; specifically, demonstrate greater consistency and superiority in

maintaining determination, focus, confidence, and composure under pressure (Jones et al., 2002).

VIII. **Heart Rate:** The frequency of heartbeats within a specified time frame, typically measured per minute. The heart rate is determined by the frequency of ventricular contractions (the heart's lower chambers). The heart rate may be excessively rapid (tachycardia) or excessively slow (bradycardia). The pulse is an arterial bulge resulting from the waves of blood that traverse the blood arteries with each heartbeat. The pulse is frequently measured at the wrist to assess the heart rate.

IX. **Blood Pressure:** force of circulating blood on the walls of the arteries. Blood pressure is taken using two measurements: systolic (measured when the heart beats, when blood pressure is at its highest) and diastolic (measured between heart beats, when blood pressure is at its lowest). Blood pressure is written with the systolic blood pressure first, followed by the diastolic blood pressure (for example 120/80).

X. **Galvanic Skin Response:** The galvanic skin response (GSR, which falls under the umbrella term of electrodermal activity, or EDA) refers to changes in sweat gland activity that are reflective of the intensity of our emotional state, otherwise known as emotional arousal.

XI. **Cortisol:** Cortisol is a glucocorticoid hormone that your adrenal glands produce and release t plays many important roles, including regulating the body's stress response, the body's use of fats, proteins, and carbohydrates, or metabolism, suppressing inflammation, regulating blood pressure, regulating blood sugar.

Significance of the study

The present study aims to test and study the effectiveness of SIT, which is a cognitive-behavioral therapy-based intervention developed by Meichenbaum (1985), and EMDR, which is a client-centered psychotherapy-based treatment protocol on the experience of anxiety, stress, and mental toughness in Shooters. This study was planned, based on the major gaps identified and the recommendations made through a number of research articles, theories, and recent trends in sports psychology skill training programs.

Significance:

I. The present study will study the effectiveness of SIT on the selected psychological and physiological parameters that will help to generate a comprehensive understanding of the effect of these two interventions on the aforementioned parameters.

II. The present study will be a step toward studying the effectiveness of stress inoculation training and eye movement desensitization and reprocessing on Indian shooters thereby establishing empirical evidence for its use as an effective tool for managing sports competition anxiety, stress, mental toughness, and their corresponding physiological parameters for Indian athletes.

III. The present study will be examining the effect of stress inoculation training and eye movement desensitization and reprocessing on shooters who experience sports competitive anxiety, which will help to substantiate its use as an effective tool for managing anxiety and stress along with their corresponding physiological parameters.

IV. The present study will be the first of its kind to evaluate the strength of stress inoculation training to eye movement desensitization and reprocessing independently on the selected psychological and physiological parameters in golfers, thereby establishing empirical evidence of the strength of each intervention in their goal to enhance mental toughness, and reduce the experience of anxiety and stress.

V. This study will also help to bridge the gap between the studies that have independently ascertained the impact of stress inoculation training and eye movement desensitization.

CHAPTER II

REVIEW OF LITERATURE

The present chapter focuses on analyzing the actual research problem by exploring the various gaps in the current selected research area. Several articles from various journals, internet sites, and books were collected to gain insight into the existing information on the topic of interest. The following are the list of reviews that were investigated by various researchers at different point of time

2.1 Psychological and physiological variables in Shooting

Ortega & Wang (2018) examined the control of psychological and physiological states that is essential to ensuring peak performance in competitive elite sports, particularly in precision sports, where the margin of error is in decimals. This intervention studied air rifle and air pistol shooters (N= 50) by subjecting them to an integrated mental skills and biofeedback training program. In addition to HRV biofeedback training, the experimental group underwent an intervention program that emphasized on self-talk, relaxation, imagery, and routines. Following the intervention, the experimental group outperformed the control group in terms of self-talk, relaxation, imagery, and automaticity, and their pre-performance HRV was noticeably improved. Even though the improvement in shooting scores at the conclusion of the intervention was not statistically significant, it still has major applications in high-level sports. Higher shooting scores and an improvement in HRV after the intervention demonstrate stronger psychophysiological control, which in turn led to enhanced performance.

Zhang et al. (2024) studied young shooters (N=50) from China of varied levels of competency in terms of their performance level to understand the relationship between anxiety (state), heart rate variability and their respective performance in shooting. The results of the study revealed significant differences in experience of pre competition anxiety, heart rate variability and shooting performance of first level athletes to those at second level.

2.2 SIT in Sports

Mace & Carroll (1985;1986) have contributed significantly to this area of research wherethe stress inoculation training program has been applied to the sport's settings. They have successfully applied SIT in abseiling (1985), Squash (1986), and Gymnastics (1986) and also concluded that it has considerable potential in the world of sports. In their study to see the effect of SIT on anxiety prior to abseiling, the sample was divided into an experimental & control group, which upon analysis of state anxiety scores obtained post-intervention by administration

of state-trait anxiety inventory revealed that the stress inoculation group exhibited reduced stress and anxiety levels compared to the control group. In a case study undertaken by them (1986), to study the relevance of SIT in improving the form of a young female gymnast post injuries showed that the SIT program was indeed successful in obtaining the desired results.

Larsson et al. (1988) conducted a study in which they designed a time and cost-efficient psychosocial training program of stress inoculation that consisted of 14 elite Swedish golfers in an experimental group and 14 golfers of a similar level of competence in a control group, following which their performance, as well as appraisal of competition situation, was evaluated, as well as their tendency to engage in negative thinking, the results indicated that performance improvements in the experimental group were found to be significantly better than that of the control group, also their intervention group reported that they engaged relativelyless in negative thinking and also appraised the situation of competition as more benign and less threatening.

Kegelaers et al. (2019) A mixed-methods study of a pressure training intervention aimed at fostering resilience in female basketball players was done to assess the efficiency of regular exposure to pressure in enhancing resilience development. The quantitative results indicated that the intervention effectively diminished team-level vulnerabilities.

Imber (2018) investigated the effects of Stress Inoculation Training (SIT) and Heart RateVariability Biofeedback (HRVBF) training as an intervention on highly anxious scuba divers,and found that it significantly reduced anxiety, heart rate (measured as bpm) among other dependent variables.

2.3 SIT and its effect on physiological parameters

Fontana, A.M., et al. (1999) studied the Impact of a Peer-Led Stress inoculation training-based intervention on state anxiety and heart rate in College Students. A six-session treatment intervention impact at pre-treatment, post-treatment, and a 6-month follow-up, was conducted, assessing the blood pressure, heart rate, subjective severity of physical symptoms, and state-anxiety levels. The results of the study revealed that participants in the treatment group showed lower heart rates and state anxiety levels post-treatment than the control group. It was also seen that the difference in heart rate between the groups was maintained at the follow-up stage.

Tarkhan et al. (2012) studied the effectiveness of group stress inoculation training (SIT) on the systolic and diastolic blood pressure and life quality in the women involved blood pressure. Results of the studied showed a significant effect of stress inoculation training on decreasing the blood pressure and enhancing the quality of life in woman.

2.4 EMDR in Sports

Garcheck (2010) employed the EMDR treatment protocol to determine the efficacy ofthe same for competitive cycling sport, wherein the EMDR protocol was specifically catered for an international cyclist. The EMDR therapeutic, client-centered treatment plan progressed in a manner under which the components of stage 8 i.e., installation and resource development were transferred to stage 2 during the study. Both qualitative and quantitative data were assimilated and analyzed in order to generate the results that asserted that EMDR showcased a positive impact on the performance of the cyclist, along with a positive impact on self-esteem, motivation, and competitive anxiety.

Turner et al. (2017) carried out a study to test the effectiveness of EMDR intervention on the negative effects of prospective imagery on a sample that consisted of four golfers in the amateur category. The research design selected for this study consisted of a single case design with multiple-baseline and across-participants designs. Post EMDR intervention it was seen that all the participants in the sample revealed a reduction in the experience of detrimental effects of negative prospective imagery.

Bennett & Maynard (2016) presented the recommendations for effective treatment programs and psychological interventions for performance blocks in their study, in which it was advocated that EMDR is an efficacious method of tackling participants who are affected by performance blocks coupled with debilitating anxiety, as experienced in the phenomenon of yips.

2.5 EMDR and its effect on physiological parameters

Sack et al. (2008) Examined whether changes in psychophysiology during EMDR sessions are linked to subjective and objective reductions in PTSD symptoms. Their findings showed that during EMDR, information processing is accompanied by a decrease in physiological activity, subjective disturbance, and stress reactivity to traumatic memories.

Söndergaard, H. P., & Elofsson, U. (2008) Examined findings regarding the impact of eye movements during genuine EMDR sessions for chronic PTSD in refugees who have

endured war and torture. This study's findings indicated clear physiological impacts of eye movements, including arousal indicated by elevated finger temperature and alterations in the balance between the parasympathetic and sympathetic autonomic nerve systems.

Estrada et al. (2002) studied the efficacy of the EMDR-PRECI protocol on female patients who suffered from PTSD of cancer-related diagnosis on the PTSD symptoms of the patients, along with changes in cortisol and immunoglobins post-EMDR treatment. The results extended support to the use of treatment for managing the symptoms of PTSD while no major changes were observed in the bio-indicators.

2.6 Studies on EMDR and SIT

Cook-Vienot & Taylor (2012) Conducted a comparative analysis to investigate the impacts of eye movement desensitization and reprocessing (EMDR) and stress inoculation training (SIT)/biofeedback on the test anxiety of college students. The study's results indicated that both therapies were significantly helpful in reducing test anxiety among college students, with EMDR generally demonstrating superior efficacy compared to SIT.

Lee et al. (2002) studied the effects of stress inoculation training were compared with eye movement desensitization and reprocessing as a treatment for participants with PTSD. Twenty- four individuals with PTSD were randomly assigned to one of two treatment conditions: EMRDR or stress inoculation training. The participants in the study acted as their own wait- list control group. The outcome measures included measures of PTSD and depression. Although there were no differences between the two treatments at the end of therapy, EMDRwas associated with better results on various subscale measures.

CHAPTER III

METHODOLOGY

This chapter of the synopsis deals with the detailed methodology used for defining theresearch design, selection of subjects, variables, training program, and the proposed tools of data collection to be used.

3.1 Selection of subjects

For the purpose of the study, a total of 43 Shooters were invited to participate voluntarilyin a screening test for sports competition anxietyusing the sports competition anxiety test (SCAT). Out of 43 shooters, 38 shooters scored in a range of medium to high sports competition anxiety. Further out of 38 shooters only 30 further participated in the study. As a result, this sample of 30 will be randomly assigned to experimental treatment group I i.e., stress inoculation training-based intervention (n=10), experimental group II i.e., eye movement desensitization and reprocessing based intervention (n=10) and active control group (n=10). The age range of the sample selected for the study is 18 to 30 years (Agemean 21.8 ± 1.88).

Inclusion Criterion of sample

I. The sample will comprise only those shooters who score medium to high on sports competition anxiety based on the SCAT screening.

II. The participants must be 18 years of age or above i.e., adults to be able to qualify as a suitable sample for the proposed experimental treatments.

3.2 Selection of Variables

After analyzing the various factors associated with the problem, certain variables were selected to test during the study

Independent variables:

I. **Stress Inoculation training (SIT):** SIT program can be broadly categorized into two types of training protocol in which the first part is mental and physical relaxation through breathing techniques that are learned over 3 phases of the psychological skill training schedule i.e., education, rehearsal and application phase. Similarly, the second part of SIT intervention consists of cognitive training, which in turn includes Meichenbaum's self-instructional training and imagery training. As followed in part 1, in the second part of the training also the same phases of education, rehearsal and

application will be encompassed. The two parts of the SIT training protocol comprise of 3 training aspects, with each aspect having 3 phases, which are the education, rehearsal, and application phase.

II. **Eye Movement Desensitization and Reprocessing (EMDR):** Another independent variable is the intervention on EMDR which comprises of 8 stages, whose effects will be studied on various psychological and physiological variables.

Dependent variables:

Based on the review of literature from various sources such as research papers, articles,and references from books, the following dependent variables were selected for the study

A.) Psychological variables

I. Sports Competition Anxiety
   - Cognitive anxiety
   - Somatic anxiety
   - Self-confidence

II. Mental Toughness
   - Control
   - Constancy
   - Confidence

III. Perceived Stress

B.) Physiological variables

I. Heart Rate

II. Blood Pressure
   - Systolic blood pressure
   - Diastolic blood pressure

III. Galvanic Skin Response

IV. Cortisol level

3.3 Selection of Tests

The present study relies on a mixed measure approach as a means of a collection of data, as it has the potential to increase the depth of research findings and provide a more comprehensive report. Hence, for the selected psychological variables, such as anxiety, perceived stress, and mental toughness both, questionnaires and semi-structured interviews will be used as means of collecting data, while for the physiological parameters in the study, biofeedback will be used to monitor and collect the data. The proposed methods of testing were chosen after taking references from suitable research articles and it was also made sure that these tests were standardized, ideal for the chosen subjects, and most suitable for the purpose of the study.

Tools for collection of psychological variables

I. **Sports competition anxiety test (SCAT):** This test developed by Martens (1977) is a self-reporting questionnaire, comprising of 15 questions on anxiety that assesses an athlete's responses to a series of statements about how they feel in a competitive situation and based on their response, the administrator of the test can determine a measure of their level of anxiety categorized as low, moderate and high. According to the manual, the internal consistency of the test is in an acceptable range as the Kuder-Richardson coefficient values obtained for the different samples are on the order of 0.90 or higher (Martens, 1977). The test-retest reliability of the SCAT has been documented to range from r= 0.73-0.88 and internal consistency of r= 0.95-0.97.

II. **Competitive state anxiety inventory-2 (CSAI-2):** The Competitive State Anxiety Inventory-2 is a 27-item self-report inventory developed by Martens et al. (1990) designed to measure state anxiety in competitive situations. The CSAI-2 comprises of three subscales measuring cognitive anxiety, somatic anxiety, and self-confidence, with each subscale comprising of nine items. Reliability analysis of CSAI-2 conducted by Fernandez et al. (2013) demonstrated that the original model of the CSAI-2 (9 items per factor) achieved goodlevels of internal consistency with Cronbach alpha levels exceeding .80, which is consistent with previous research (Coelho et al. 2007; Fernandez et al. 2007; Lundqvist& Hassmen, 2005; Martens et al., 1990).

Tool for collection of data on Mental Toughness:

I. **Sports Mental Toughness Questionnaire (SMTQ):** The SMTQ consists of a 3-factor structure (confidence, control, and constancythat is supported by studies on its

psychometric properties based on the confirmatory analysis using structural equation modeling that confirmed the overall structure. Research has demonstrated that this inventory exhibits good psychometric qualities, including sufficient reliability, divergent validity, and discriminative capacity. The Internal consistency estimates for SMTQ ranges from .69 to .78, as the computation of Cronbach's α showed acceptable internal consistency for each of the three factors ($\alpha \geq .70$; Kline, 2005): Confidence = .80, Constancy = .74, and Control = .71

Tool for collection of data on Perceived Stress:

I. **Perceived Stress Scale (PSS-10):** This tool is a self-report measure of the extent of perception or appraisal in the respondent's life that was originally developed by Cohen et al. (1983). Studies have also revealed that the psychometric properties of the PSS-10 are superior to those of the PSS-14. Therefore, it is recommended that the PSS-10 be used to measure perceived stress, both in practice and research. Cronbach's alpha of the PSS-10 was evaluated at >.70

Tools for collection of qualitative data on selected psychological variables:

I. **Semi-structured interview:** A semi-structured interview will be employed for the collection of qualitative data in the form of open-ended questions for the selected psychological parameters in the study in order to provide a more holistic result of the effectiveness of the interventions under study.

Tools for measurement and collection of data for the selected Physiological variables:

I. Biofeedback device will be used for the collection of data on Physiological variablesi.e., heart rate and galvanic skin response

II. Dr Morpen Blood pressure machine will be used for collecting data on systolic anddiastolic blood pressure

III. For cortisol testing it is proposed that either blood testing or saliva cortisol testing

3.4 Research Design

This study is designed to be conducted over a span of 12 weeks, using a pre and post test experimental research design comprising 16 sessions ofSIT catered to the experimental group I while each of the ten participants in experimental groupII i.e., EMDR intervention group will receive 14 sessions of EMDR over the same span of the12-week intervention. Just before

the beginning of the intervention schedule, a preliminary administration using the sports competition anxiety test (SCAT) is conducted in order to screen a sample that meets the inclusion criterion for the study, delimited to shooters who scored moderate to high on anxiety levels.

3.5 Administration of Test and Collection of Data

For the purpose of this research, the data will be collected in person by the researcher from the subjects through use of questionnaires, and, physiological measures. For the preliminary selection of subjects based on the composite score obtained on anxiety, Sports Competition Anxiety Test (SCAT) was administered. This will be followed by a pre-intervention assessment of the selected psychological and physiological variables and thesame collection of data will take place for the assessment of the participants, post-intervention.

The athletes will be given proper instructions for filling out the questionnaires as well as sufficient time and will be encouraged to answer the questions as truthfully as possible. They will also be assured of the confidentiality of their recorded responses and will also be intimated about the procedure that will be followed if they were interested in knowing their scores and wanted individual reports.

3.6 Statistical Analysis

- For analyses of quantitative data for selected psychological and physiological variables, the data will be tested for normality using the Shapiro-Wilk test of normality.
- For analysis of quantitative data, one-way MANOVA and ANCOVA will be employed using IBM SPSS
- For analysis of psychological variables, in addition to quantitative methods of statistical analysis, the semi structured interview data will be analyzed using qualitative methods of data analysis.

3.7 Expected Outcome

The study is expected to demonstrate the significant effects of stress inoculation training (SIT) & eye movement desensitization and reprocessing (EMDR) on selected psychological and physiological variables in shooters. It is anticipated that these interventions may lead to improvements in pre competition anxiety, mental toughness and perceived stress while also

enhancing better physiological regulation through markers such as heart rate, blood pressure, galvanic skin response and cortisol. These results could potentially provide valuable insights into how psychological skill training-based interventions can lead to better psychological and physiological regulation in sportsperson, particularly in precision-based sports such as shooting.

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